

Docket No.: 440-001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Scott Wilkings and Koepp (Kip) Douglas Petrykowski

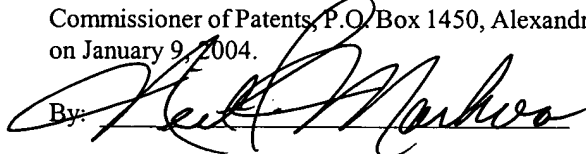
Serial No.: 10/670,404

Filed: September 25, 2003

For: MONO-BLOC BRAKE CALIPER AND
EVAPORABLE PATTERN FOR CASTING SAME

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

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By: 

INFORMATION DISCLOSURE STATEMENT

Sir:

Please enter the attached Information Disclosure Statement into the above-identified application in fulfillment of the information disclosure requirement.

U.S. Patent 5,515,948 discloses a racing brake caliper assembly having multiple caliper sections bolted together to form inner hydraulic fluid passageways on opposed sides of the piston cylinders that provide enhanced pressure equalization in both caliper sections. The cylinders are located on opposite sides of a friction pad chamber in which friction pads are disposed to move against the rotating brake rotor. With each additional separate caliper segment, the possibility of movement that will damage the integrity of the disclosed caliper assembly increases.

U.S. Patent 6,260,670 discloses an opposed piston type disc brake having two caliper sections bolted together and includes an exterior tubular cross-over fluid transport passageway. The design of this assembly involves several different manufacturing and handling cost factors that are obviated by the mono-bloc disc brake caliper and novel evaporable casting pattern of the invention.

One-piece disc brake castings are known to eliminate the problems associated with bolting separate casting segments together to produce disc brake calipers. Such mono-bloc calipers are also known to provide structural integrity to a disc brake assembly particularly when using aluminum alloy castings. U.S. Patent 6,367,595 discloses a mono-bloc caliper having symmetrically disposed hydraulic fluid passageways on opposed sides of piston cylinders. Handling of the casting in the finishing operation is not minimized, however. For fluid transport passageways are drilled from different directions to require excessive handling to produce the finished cast brake caliper.

U.S. Patents 4,093,043; 4,494,630; and 4,867,280 each discloses a one-piece caliper housing having an internal fluid passageway. The manner of forming the disclosed housing is not explained in these patents. The disposition of the various passageways, however, indicated that they are drilled. So any particular problem associated with an evaporable casting pattern for making these known devices is not disclosed nor is there any disclosure of how to overcome the problems that are solved by the invented brake caliper design and evaporable pattern process of the invention.

Casting processes using lost foam as in the current invention are known as found in U.S. Patent 2,830,343, which discloses a casting method without a mold cavity wherein a polystyrene foam pattern is embedded in sand. The foam pattern left in the sand evaporates when molten metal is poured into the foam pattern. The molten metal replaces the foam pattern thereby precisely duplicating all features of the pattern. U.S. Patent 4,947,923 is incorporated by reference herein in its entirety and discloses the historical development of the evaporable pattern casting process.

The known lost-foam process includes the following basic steps. First a foam pattern and gating system is made using some sort of mold. Secondly, the mold or foam pattern and gating system are usually assembled into a cluster of individual parts to facilitate large volume production. The cluster is then coated with a porous ceramic/refractory coating. The prepared cluster is then placed into loose unbonded particulate material such as sand that is packed around the foam cluster

by vibrating the entire mold assembly. Molten metal poured directly into the cluster evaporates the foam, and the foam vapor disperses in the interstices of the sand with the metal replacing the foam. When solidified, the metal cluster is removed, separated, and the individual parts are finished using well known drilling and machining methods.

The pattern includes a sprue and runner system in the particulate material for pouring the metal into the mold. The sprue typically stands higher than the high point of the mold to provide a metallostatic head of metal sufficient to cause the metal to readily flow into the mold and completely displace the evaporable pattern therein. A metallostatic pressure head of at least about 1 psi when the sprue is about 10 inches higher than the high point of the mold which is typical for a pattern made of expanded polystyrene. Other evaporable materials useful as patterns for this process include polymethyl methacrylate and polyalkylene carbonate. Typically, porous protective refractory coatings on the pattern comprise silica, mica, and clay binders and serve to improve pattern stiffness, prevent sand erosion, improve casting surface finish, and aid in release of gas and liquid products from foam pyrolysis. The coatings may be applied by spraying or dipping.

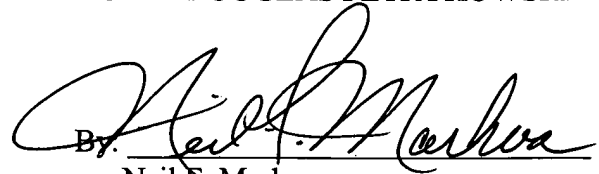
U.S. Patent 5,080,955 discloses an evaporable foam pattern assembly of the general type used in this invention. U.S. Patents 4,777,997; 4,802,447; 5,372,176; and 6,227,333 each disclose various foam pattern devices that produce internal passageways for engine blocks and transmission housings. However, none of these patents or anyone else in the lost-foam casting field recognizes a problem in producing a one-piece article casting having an internal tubular passageway with a diameter of less than about 6.0 mm, and more specifically within the range of from about 4.0 mm to about 6.0 mm. A disc brake caliper requires such a small passageway to achieve the desired brake pedal firmness and movement as discussed above. Gaining free flow of particulate material from an inner cylindrical cavity section into a passageway section of an evaporable pattern during the casting process is not a recognized problem. For without such free particulate flow a substantially completely filled small

diameter passageway cannot be obtained with known pattern forming techniques. And without a compacted particulate material, the cast-in passageway cannot be formed in the mono-bloc casting.

The patents listed therein are in Applicant's application and a full copy of each of the patents is attached.

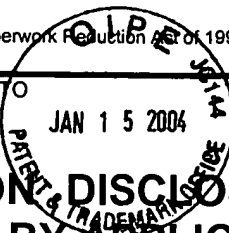
Respectfully submitted,

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Substitute for form 1449A/PTO		Complete if Known	
 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)		Application Number	10/670,404
		Filing Date	September 25, 2003
		First Named Inventor	Wilkins, Scott
		Art Unit	
		Examiner Name	
Sheet	1 of 1	Attorney Docket Name	440-001

U.S. PATENT DOCUMENTS					
Examiner Initials	Cite No. ¹	Document Number Number-Kind Code ²	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 2,830,343	04-15-1958	H.F. Shroyer	
		US- 4,093,043	06-06-1978	Smith	
		US- 4,494,630	01-22-1985	Stoka et al	
		US- 4,777,997	10-18-1988	Corbett	
		US- 4,802,447	02-07-1989	Corbett	
		US- 4,867,280	09-19-1989	Von Gruenberg et al	
		US- 4,947,923	08-14-1998	Rikker	
		US- 5,080,955	01-14-1992	VanRens	
		US- 5,372,176	12-13-1996	Brown et al	
		US- 5,515,948	05-14-1996	Gilliland	
		US- 6,227,333	05-08-2001	Scheib et al	
		US- 6,260,670	07-17-2001	Maehara	
		US- 6,367,595	04-09-2002	Mori et al	
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FOREIGN PATENT DOCUMENTS						
Examiner Initials	Cite No. ¹	Foreign Patent Document Country Code ³ -Number ⁴ -Kind Code ⁵	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶

Examiner Signature	Date Considered
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